UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
RESEARCH AND DEVELOPMENT

MEMORANDUM

SUBJECT: Sauget Area 1 Superfund Site, Sauget, IL (02-R05-001)
Feasibility Study-Source Area Remedial Options

FROM: Steven D. Acree, Hydrogeologist
Technical Assistance and Technology Transfer Branch

TO: Mike Ribordy, RPM
U.S. EPA, Region 5

As requested, the following additional discussion of the advantages and technical limitations of source area remedial options involving conventional pumping technology is provided for your information. Technologies under consideration in the feasibility study (FS) for Area 1 included DNAPL recovery using pumping wells; extraction of aqueous leachate and NAPL at the downgradient boundary of the waste matrix; and extraction of aqueous leachate and NAPL within the waste matrix. In general, the technologies differ with respect to potential rates of contaminant mass reduction that are attainable. As noted in previous discussions, the most appropriate technologies, including more aggressive source removal technologies, for these sites depends on site conditions, particularly, the distribution of NAPL which appears to serve as a primary source material for continued ground-water contamination at this site.

One of the least aggressive of the proposed options is recovery of only DNAPL using conventional wells installed through the waste matrix. Under this option, periodic recovery would be manually initiated and continued at each well until the discharge from the pump was composed predominantly of water. This option will likely result in very low rates of contaminant removal due to use of a manually actuated system, rather than an automated system, and the very low hydraulic stress imposed by the low rate of fluid recovery. The low rate of fluid recovery results in a minimal increase in hydraulic gradient and, accordingly, minimal influence on DNAPL movement. The well merely serves as a sump into which DNAPL adjacent to the well, if present above residual saturations, drains.

Leachate recovery within the waste matrix is a more aggressive option that may result in significantly greater contaminant mass recovery. As proposed, leachate recovery would consist of extraction of both aqueous-phase contaminants and NAPL. Although not discussed in the FS, this type of system may be optimized to enhance NAPL recovery rates through manipulation of hydraulic gradients. However, it is noted that NAPL recovery using this technology is unlikely to remove greater than approximately 10% to 25% of existing NAPL within reasonable time frames

based on historical experience. If the system was designed predominantly for recovery of aqueous-phase leachate, it is expected that contaminant mass recovery would be greatly reduced. It is likely that such systems would not attain specific contaminant reduction objectives within reasonable time frames.

Recovery of aqueous-phase contaminants and NAPL using a system located at the downgradient boundary of Sites G, H, I, and L was also proposed as an option in the FS. This system design would likely result in recovery of predominantly aqueous-phase leachate due to the locations of the wells at the edge of the zone impacted by NAPL. As noted above, such a system may result in much lower rates of contaminant removal than systems primarily designed to recover NAPL. The relative effectiveness of this type of pump-and-treat system was evaluated in Appendix D of the FS. This system would likely represent one of the least efficient options for contaminant mass recovery.

In general, potential benefits of contaminant mass removal include ultimate reduction in remedial time frames dependant on the degree of mass removal that is achieved; changes aqueous-phase concentrations, if more aggressive technologies are used and result in much greater source removal effectiveness; and a reduction in NAPL mobility due to reductions in NAPL saturations. Sufficient information concerning NAPL properties/distribution and properties of the media in which the NAPL is found is not available to support detailed evaluations of the effectiveness of the various removal options, potential system designs, and remediation time frames within an acceptable degree of uncertainty.

With respect to the use of NAPL removal technologies through an existing landfill cap, installation of a cap would preclude consideration of excavation, which can be part of an effective removal strategy. Several other potential removal technologies may generally be implemented through a cap. However, penetration and, ultimately, patching of the cap would be required and more disruptive technologies, such as installation of drains for NAPL recovery, may be less desirable. Although cap penetration may result in some increase in infiltration through the cap, it is noted that NAPL materials are currently distributed within the saturated zone below the proposed cap. Therefore, the potential effectiveness of the cap in reducing contaminant concentrations in ground water or additional migration of the contaminant plume may be very limited. It appears unlikely that a small increase in infiltration through the cap would significantly affect its performance with respect to these criteria.

If you have any questions concerning this evaluation, please do not hesitate to call me at your convenience (580-436-8609). We look forward to future interactions with you concerning this and other sites.

cc: Rich Steimle (5102G)
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